

CLAIMS

1 1. A hydrogel patch, comprising:
2 (a) a hydrophilic compound which forms a gel in the
3 presence of water, which compound is present in an amount of
4 about 4% or more by weight based on the weight of the
5 hydrogel;
6 (b) water in an amount of about 95% or less based
7 on the weight of the hydrogel;
8 (c) an enzyme capable of catalyzing a reaction; and
9 (d) an electrolyte.

1 2. The hydrogel patch of claim 1, wherein
2 background signal in the gel is less than approximately 200
3 nA.

1 3. The hydrogel patch of claim 1, wherein
2 background signal in the gel is less than approximately 50
3 nA.

1 4. The hydrogel patch of claim 1, wherein a product
2 of the reaction in step (c) is not degraded more than 20% in
3 30 minutes.

1 5. The hydrogel patch of claim 1, wherein diffusion
2 of an analyte that reacts in the reaction of step (c) is
3 rate limiting, and wherein diffusion of the analyte is more
4 rapid than the measurement time.

1 6. The hydrogel patch of claim 1, wherein the
2 hydrogel further comprises components for maintaining a
3 selected hydrogel environment, and wherein the environment

4 enhances the conversion of analyte to product of the
5 reaction in step (c).

1 7. The hydrogel patch of claim 1, wherein the
2 enzyme catalyzes a reaction between glucose and oxygen
3 resulting in the generation of electrons.

1 8. The hydrogel patch of claim 7, further
2 comprising:

3 (e) a buffering agent present in an amount
4 sufficient to maintain a pH in the hydrogel in a range of
5 from about 3 to about 9.

1 9. The hydrogel patch of claim 8, further
2 comprising:

3 (f) mutarotase.

1 10. The hydrogel patch of claim 1, wherein the
2 hydrophilic compound is selected from the group consisting
3 of polyethylene oxide, polyacrylic acid, polyvinyl alcohol,
4 Carbopol®, and polyacrylamidomethylpropanesulfonate and
5 copolymers thereof; the electrolyte is selected from the
6 group consisting of NaCl and KCl and the enzyme is glucose
7 oxidase, wherein glucose oxidase is present in an amount in
8 a range of 10 Units to 5,000 Units per gram of the sum of
9 the absorbant material in step (a) and the aqueous solution
10 in step (b).

1 11. The hydrogel patch of claim 1, wherein the
2 hydrophilic compound is present in an amount of less than
3 about 40% by weight and the water is present in an amount of
4 more than 60% by weight based on the weight of the hydrogel.

1 12. The hydrogel patch as claimed in claim 1,
2 wherein the hydrophilic compound is present in an amount in
3 the range of from about 8% to about 12% based on total
4 weight of the hydrogel when a humectant is present in the
5 hydrogel.

1 13. The hydrogel patch as claimed in claim 1,
2 wherein the hydrophilic compound is present in an amount in
3 the range of from about 15% to about 20% based on total
4 weight of the hydrogel when a humectant is omitted from the
5 hydrogel.

1 14. The hydrogel patch of claim 1, characterized by
2 a flat configuration having a thickness in a range of about
3 5 μm to about 60 mils.

1 15. The hydrogel patch of claim 14, characterized
2 by a first and a second surface area wherein each surface
3 area is in a range of about 0.5 cm^2 to about 10 cm^2 and
4 wherein the patch has a thickness of from about 5 μm to 10
5 mils.

1 16. The hydrogel patch as claimed in claim 1,
2 further comprising a structural support material embedded in
3 the hydrogel, wherein the structural support material is a
4 non-woven fabric having an outer parameter configuration and
5 size substantially equal to that of the hydrogel patch.

1 17. An absorbent material patch, characterized by:
2 (a) an absorbent material having embedded therein a
3 dry enzyme;
4 (b) a package attached to a first surface of the
5 absorbent material, the package containing an aqueous

6 solution of water having dissolved therein an electrolyte,
7 the package being separated from the absorbent material by a
8 seal which is breakable on the application of force and
9 further wherein the package is readily detachable from the
10 absorbent material after the seal is broken.

1 18. The absorbent patch as claimed in claim 17,
2 wherein the enzyme is lyophilized glucose oxidase present in
3 an amount in the range of 10 Units to 5,000 Units per gram
4 of the sum of the absorbent material in step (a) and the
5 aqueous solution in step (b).

1 19. The absorbent patch as claimed in claim 18,
2 wherein the enzyme is present in an amount of 100 to 3,000
3 units per gram of the sum of the absorbent material in step
4 (a) and the aqueous solution in step (b), the aqueous
5 solution further comprises a buffering agent dissolved in
6 the water which buffering agent is present in an amount
7 sufficient to maintain the pH of the absorbent patch in the
8 range of from about 3 to about 9.

1 20. The absorbent patch as claimed in claim 17,
2 wherein the absorbent material is a sponge and the enzyme
3 catalyzes a reaction with glucose.

1 21. The absorbent patch as claimed in claim 17,
2 wherein the absorbent material has a first and a second
3 surface area wherein each surface area is in a range of from
4 about 0.5 cm² to about 10 cm² and a thickness in the range
5 of about 5 μm to about 50 mils.

1 22. A patch having a thickness in a range of about
2 5 μm to 50 mils and a first and a second surface each having

3 an area in a range of about 0.5 cm² to about 10 cm²,
4 comprising:
5 a material which holds water in place;
6 an enzyme which catalyzes a reaction with glucose.

1 23. The patch of claim 22, further comprising;
2 water in an amount of about one to twenty times by
3 weight the amount of the material which holds water in
4 place;
5 a chloride containing salt, and
6 a buffering agent present in an amount sufficient to
7 maintain the pH of the patch in a range of from about 3 to
8 9.

1 24. The patch as claimed in claim 23, wherein the
2 enzyme is glucose oxidase, the material which holds water in
3 place is a polymeric compound which forms a gel in the
4 presence of water and the salt is selected from the group
5 consisting of NaCl and KCl.

1 25. The patch as claimed in claim 24, further
2 comprising:
3 a release liner on the first surface and the second
4 surface; and
5 a non-woven material embedded in the material which
6 holds water in place.

1 26. The patch as claimed in claim 24, characterized
2 by sufficient flexibility so as to conform to human skin,
3 adhesive on human skin without leaving tactile gel residue
4 on the skin when the gel is removed.

1 27. A dry gel patch on a solid support, prepared by
2 the method comprising:

3 (a) mixing dry gel components and an amount of water
4 to form a gel mixture;

5 (b) cross-linking the gel mixture to form a hydrated
6 gel;

7 (c) attaching the hydrated gel to a solid support;
8 and

9 (d) drying the gel on the solid support,

10 wherein said dry gel components comprise a
11 hydrophilic compound which forms a gel in the presence of
12 water, which compound is present in an amount of about 4% or
13 more by weight based on the weight of the hydrated gel, an
14 enzyme capable of catalyzing a reaction, an electrolyte, and
15 wherein the amount of water is about 95% or less
16 based on the weight of the hydrated gel.